



Representation of DOE SNF in the Yucca Mountain LA

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*Providing for safe,
efficient disposition of
DOE spent nuclear fuel*

Objective of DOE SNF Representation

- Minimize reliance on fuel-specific information through:
 - Reliance on engineered barriers
 - Use of a surrogate model rather than modeling individual fuels
 - Use of grouping to simplify analyses
 - Use of fuel-specific information is limited to sensitivity analyses



General DOE SNF Description

- Description of the canisters (physical, material, loading, etc.)
- Overview of the generation of DOE SNF (moderators, coolants, reactor mission, and licensing agencies)
- Description of the ranges of parameters for the 34 DOE SNF groups (physical, chemical, thermal, and radionuclear)



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Grouping for Simplification of Sensitivity Analyses

- All DOE SNF placed into 34 groups
- The 34 groups are then combined for analyses into the following:
 - 11 TSPA groups
 - 9 Criticality groups
 - 6 DBE groups



Pre-Closure Radionuclide Confinement

- DOE SNF is represented as SNF in a robust canister
- Category 1 & 2 releases will be prevented by:
 - Minimizing the probability of a drop
 - Limiting the lift height
 - Using canisters unlikely to breach if dropped



Pre-Closure Radionuclide Confinement (continued)

- Beyond Category 2 calculations:
 - Based on the nominal inventory for each SFD record
 - Canister provides partial confinement
 - Cladding/matrix minimize release
 - HEPA filters mitigate release
 - Not expect to be included in LA
 - Not expected to exceed the Category 2 limits



Post-Closure Waste Isolation

- Single DOE SNF surrogate model based on:
 - Total radionuclide inventory
 - Number of DOE SNF Canisters and WPs
- Single DOE SNF surrogate model is used for:
 - Nominal scenario (along with the instantaneous degradation model)
 - All disruptive scenarios
 - Human intrusion event
 - Groundwater protection standards
 - Barrier analyses



Post-Closure Waste Isolation (continued)

- Sensitivity studies may include calculations based on:
 - Average inventory per TSPA Groups
 - Best-estimate degradation model



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Pre-Closure Criticality Control

- Probability is expected to be below the truncation limit based on:
 - Moderator controls on the facility
 - Low probability of a canister breach
 - Canister storage racks that limit interaction
- Additional measures to reduce the probability may include:
 - Geometry controls (i.e., baskets)
 - Neutron absorbers
 - Fissile/assembly loading limits



Post-Closure Criticality Control

- Probability is expected to be below the truncation limit based on:
 - Waste package
 - Drip shields
 - Natural barriers
 - Geometry controls
 - Neutron absorbers
 - Fissile/assembly loading limits



Summary of DOE SNF Representation for LA

- General description of the 34 groups
- PSA analyses relies heavily on engineered systems
 - All fuel except intact commercial is packaged in standard canisters
- Waste isolation analyses use a single surrogate model for all releases
- Criticality analyses will be completed for 2 of 9 groups
 - Supplemental analyses must be completed to support a future license amendment



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